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Montana

# MONTANA WATER SUPPLY OUTLOOK

Snowpack and Streamflow  
Forecasts as of  
June 1, 1984

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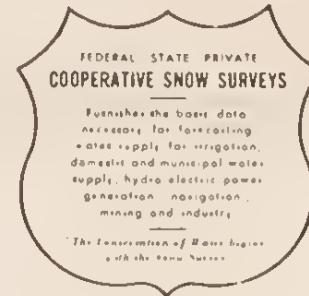
MO. 1515 L.  
HELENA, MONTANA 59601



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The Montana Water Supply Outlook is a publication of the U.S. Soil Conservation Service. The SCS administers the Cooperative Snow Survey Program in cooperation with other federal, state and private agencies, organizations, and individuals.

The report is prepared by SCS, Snow Survey and Water Supply Forecast Staff, Room 443, Federal Building, 10 East Babcock, Bozeman, Montana.



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## Late season snowpack variable

Weather during the last half of May was generally cooler than normal. Temperatures did warm for a few days near the end of the month but did not persist. These temperatures resulted in generally below average melt.

Presently, high elevation snowpack is near or above average in southwest Montana, in the Crazy Mountains, Mission Mountains, Swan Range and part of the Kootenai and Lower Clark Fork drainages near Idaho. Snowpack in the mountains near Red Lodge is also above average.

All other areas have below average snowpack for this time of year. Low elevation and most mid-elevation snow has melted.

Remaining snowpacks are isothermal (all of the snowpack is 32°F or 0°C) and daily melt is a function of daily air temperatures.

Soils under the snow or in areas having had snow recently are saturated. Other soils are drying. Many low elevation soils in northern Montana are quite dry for this time of year.

## Precipitation and tempera-tures affecting streamflow

April and May precipitation has been near to above average at most locations west of the Divide and in southwest Montana. Areas east of the Divide in central and north-central Montana have received below average moisture so far this spring. This is about the same general area that had well below average snowpack this winter.

Snow pillow data indicates most streams in the state have already peaked or are in the process of reaching their seasonal snowmelt peak. Streams with higher elevation headwaters such as the Yellowstone River and most of its tributaries above the Bighorn and the Gallatin Rivers should reach their snowmelt peak around mid-June or soon after.

Streamflows have been quite variable this spring increasing with snowmelt water caused by warm temperatures and rain, and then decreasing with cooler weather. This has generally extended the runoff period and will help provide late season water supplies in areas that still have a snowpack.

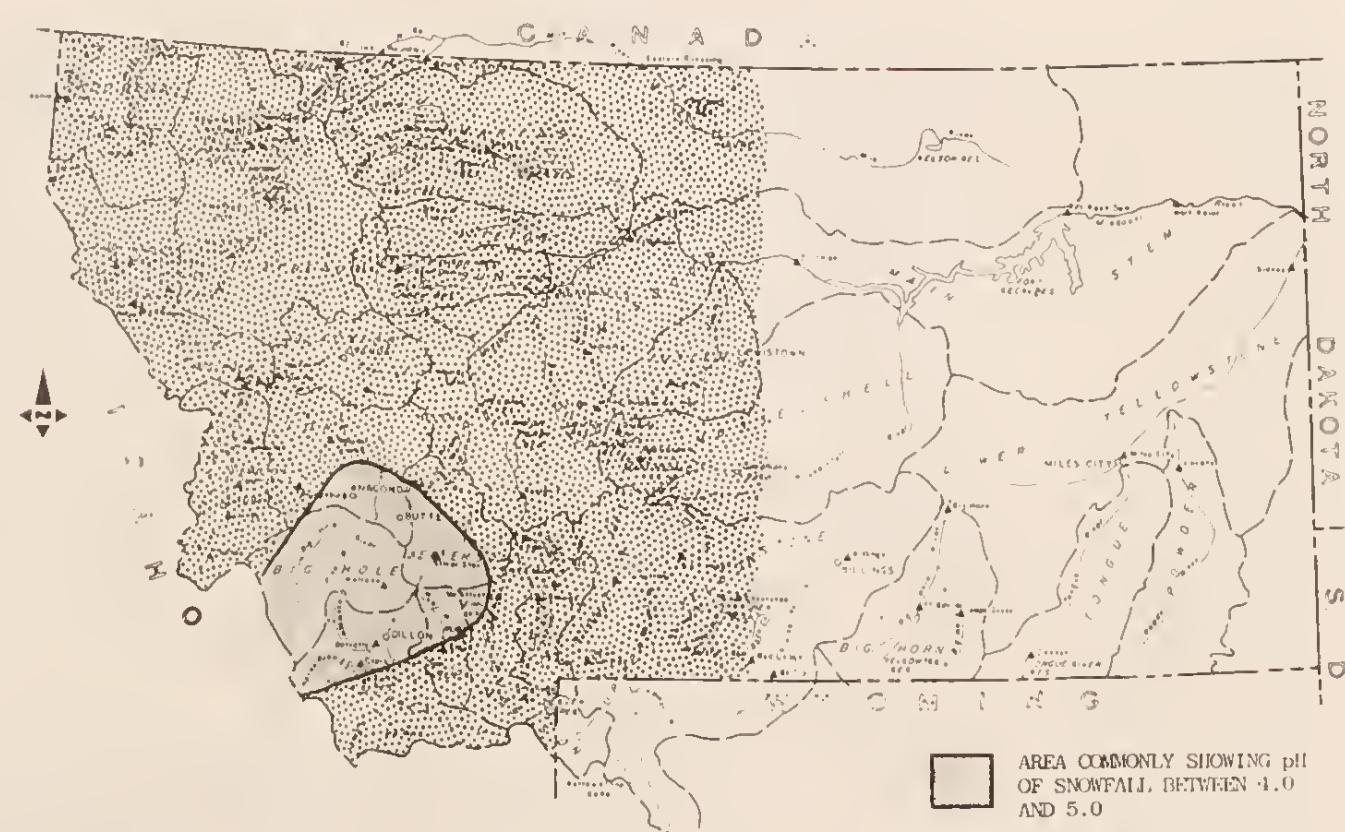


## Snowfall pH study

Snow pH measurements were made again this season in conjunction with field snow surveys.

The preliminary results indicate the snowfall in the southwest corner has lower pH than other areas. This is similar to the previous 3 years except the area showing the lower pH readings is somewhat smaller than in previous years.

There were a few low pH readings obtained this season in the vicinity of Kalispell but not enough to separate out a specific area.



SNOWFALL pH STUDY  
Winter 1983-84  
SCS Snow Surveys  
Bozeman, Montana



AREA COMMONLY SHOWING pH  
OF SNOWFAIL BETWEEN 4.0  
AND 5.0  
AREA COMMONLY SHOWING pH  
OF SNOWFAIL BETWEEN 5.0  
AND 6.0

# SNOW SURVEY DATA

SNOW June 1, 1984

DRAINAGE BASIN and/or SNOW COURSE	NAME	Elevation	THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Last Year
BADGER PASS	6900	5/30	SP	52	24.7A	18.6	36.4
BADGER PASS PILLOW	6900	6/01	SP	18.8	14.5	23.6	
BANFIELD MOUNTAIN	5600	5/29	SP	0	12.0	6.4	
BANFIELD MOUNTAIN PILLOW	5600	5/29	SP	.6	9.9	3.4	
BARKER LAKES PILLOW	8250	6/01	SP	10.9	15.2	11.2	
BASIA CREEK PILLOW	7180	6/01	SP	5.8	6.6	6.0	
BEAGLE SPRINGS PILLOW	8850	6/01	SP	.0	.0	1.4	
BEAR PAW SKI AREA	5200	5/31	SP	0	0.0	0.7	
BEAVER LAKE	5900	5/30	SP	13	5.5		
BIG CREEK	6750	6/01	SP	85	41.9	44.8	44.7
BLACK BEAR PILLOW	7950	6/01	SP	26.7	29.9	25.9	
BLACK PINE	7100	5/29	SP	7	2.8	7.0	4.4
BLACK PINE PILLOW	7100	6/01	SP	.0	7.4	4.0	
BLOODY DICK PILLOW	7550	6/01	SP	.0	.0	1.4	
BLUE LAKE	5900	5/30	SP	0	.0A	0.0	10.5
BOULDER MOUNTAIN PILLOW	7950	6/01	SP	12.0	13.7	15.0	
BOX CANYON PILLOW	6700	6/01	SP	.0	.0	0.0	
BOXELDER CREEK	5100	5/31	SP	0	0.0	-	
BRIDGER BOWL	7250	5/30	SP	49	23.6	18.4	21.9
BRIDGER BOWL PILLOW	7250	5/30	SP	21.4	16.5	17.9	
CALVERT CREEK PILLOW	6430	6/01	SP	.0	.0	0.0	
CARROT BASIN PILLOW	9000	6/01	SP	28.7	28.6	27.9	
CASHE CREEK PILLOW	7800	6/01	SP	1.8	2.0	1.9	
CHICKEN CREEK	4060	5/30	SP	0	.0	0.0	
CLOVER MEADOW PILLOW	8800	6/01	SP	15.3	10.8	12.2	
COLE CREEK PILLOW	7850	6/01	SP	16.7	27.2	13.8	
COMBINATION	5600	5/29	SP	0	0.0	.0	0.5
COMBINATION PILLOW	5600	6/01	SP	.0	.2	0.0	
COPPER BOTTOM PILLOW	5200	6/01	SP	.0	.0	0.0	
COPPER CAMP PILLOW	6950	6/01	SP	7.0	10.2	17.1	
CRYSTAL LAKE PILLOW	6050	6/01	SP	.0	.0	1.5	
DALY CREEK PILLOW	5780	6/01	SP	.0	.0	0.0	
DARKHORSE LAKE PILLOW	8700	6/01	SP	23.9	18.7	27.8	
DEADMAN CREEK	6450	5/29	SP	0	0.0	.0	0.5
DEADMAN CREEK PILLOW	6450	6/01	SP	.0	.0	0.8	
DESERT MOUNTAIN	5600	5/29	SP	0	.0	2.0	1.4
DIVIDE PILLOW	7800	6/01	SP	3.4	.9	2.1	
DIX HILL	6400	5/31	SP	0	.0	.6	
DUPUYER CREEK PILLOW	5750	6/01	SP	.0	-	-	
EMERY CREEK	4350	5/29	SP	0	.0	0.3	
EMERY CREEK PILLOW	4350	6/01	SP	.0	.0	0.0	
FATTY CREEK	5500	6/01	SP	0	.0	8.0	8.7
FISHER CREEK PILLOW	9100	6/01	SP	28.9	28.0	34.6	
FLATTOP MOUNTAIN PILLOW	6300	6/01	SP	31.2	33.5	41.6	
FOURTH OF JULY	3450	5/29	SP	0	.0	0.0	
FRIDAY HILL	4620	5/29	SP	0	.0	0.0	
FROHAER MEADOWS PILLOW	6480	6/01	SP	.0	.0	1.9	
GARVER CREEK	4250	5/29	SP	0	.0	0.0	
GARVER CREEK PILLOW	4250	5/29	SP	.0	.0	0.0	
GIBBONS PASS	7100	5/30	SP	27	13.8	8.6	10.2
GRAVE CREEK	4300	5/29	SP	0	.0	1.8	

SNOW June 1, 1984

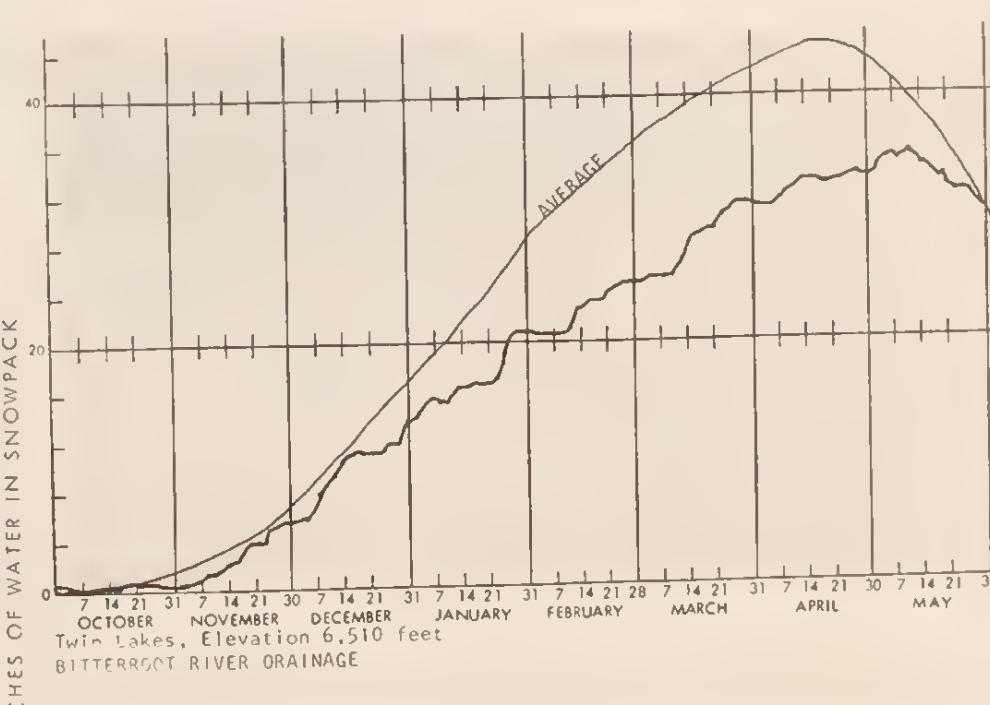
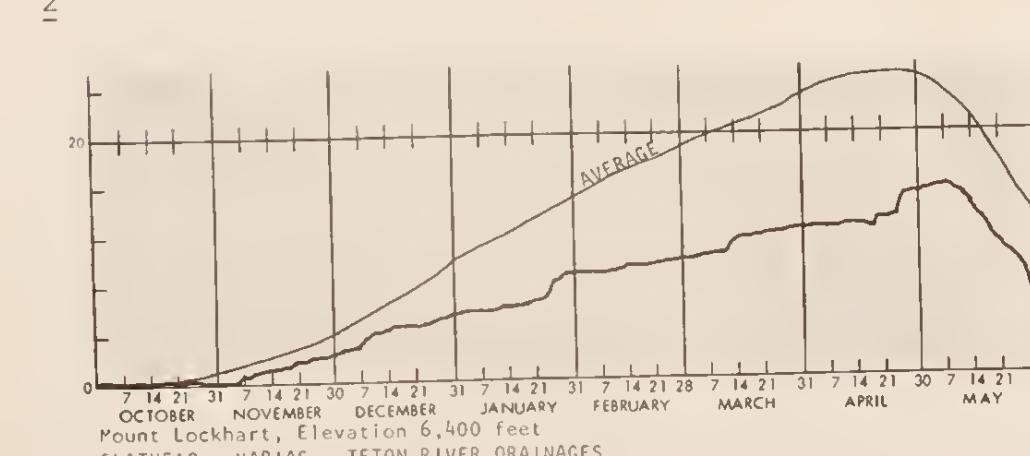
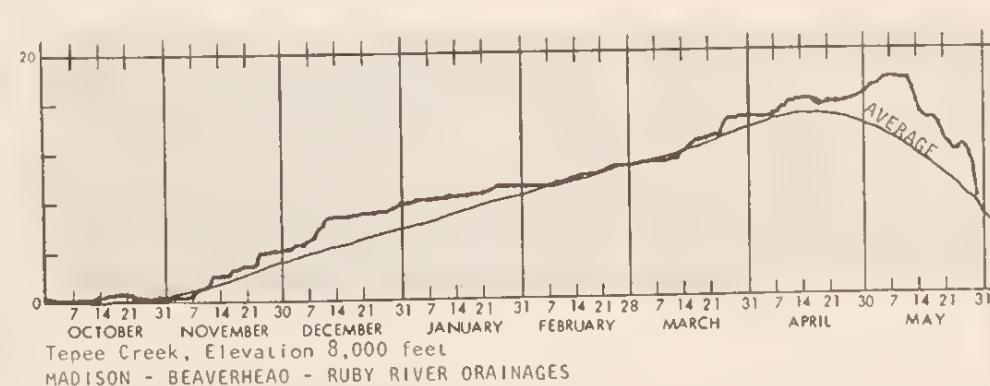
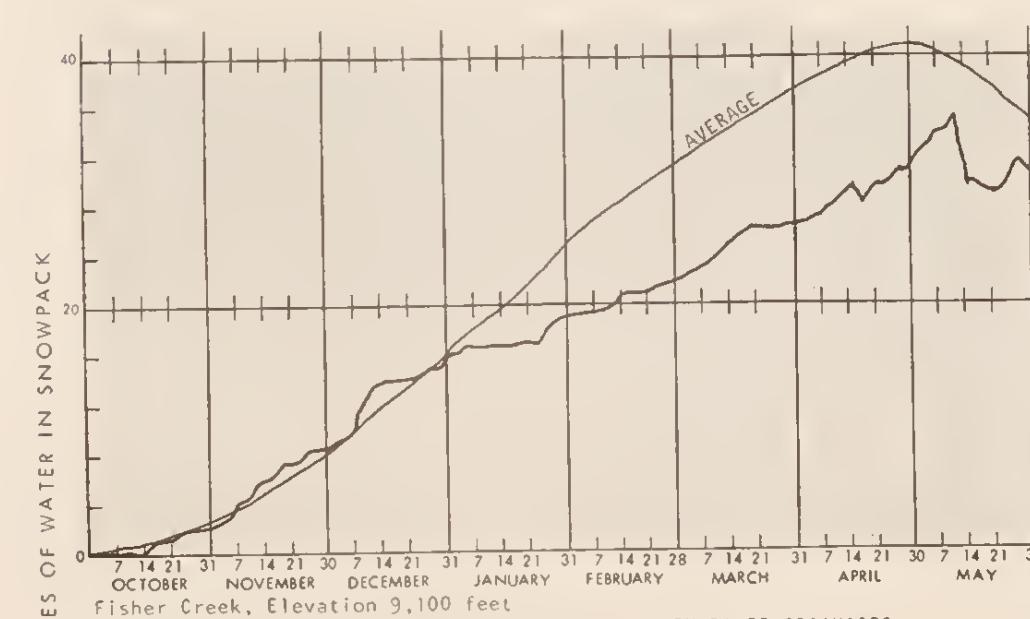
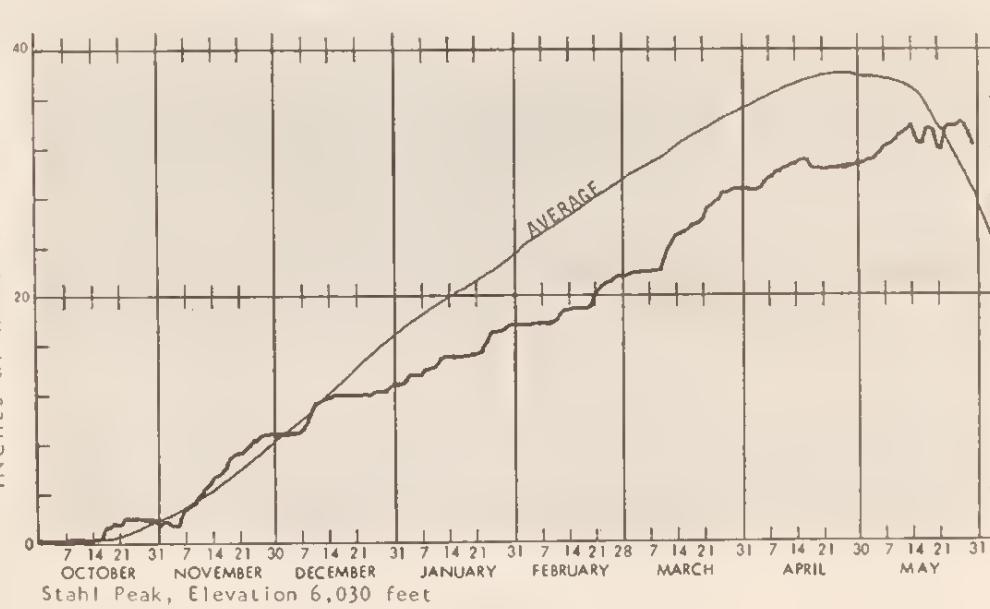
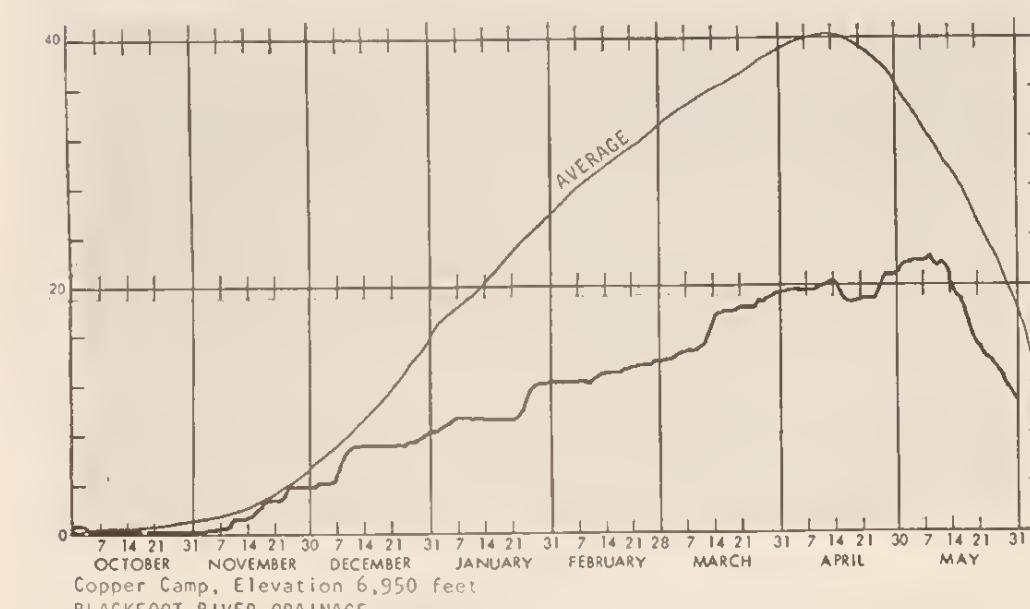
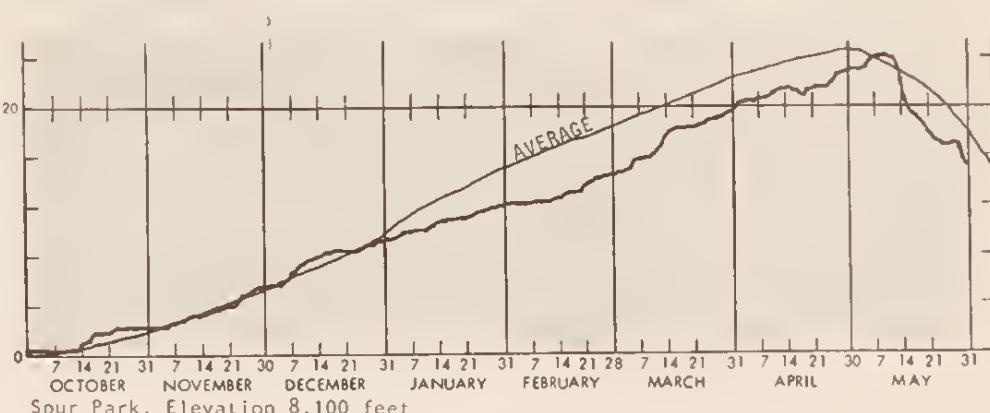
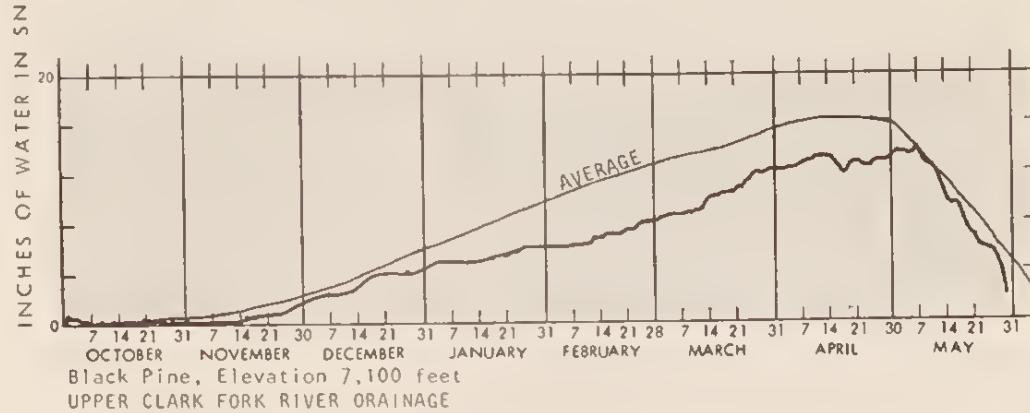
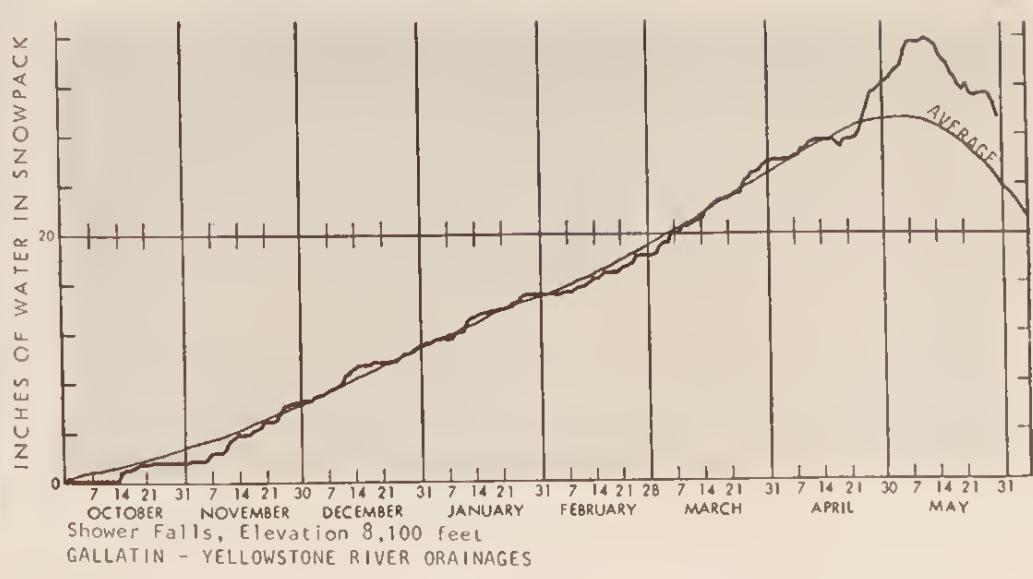
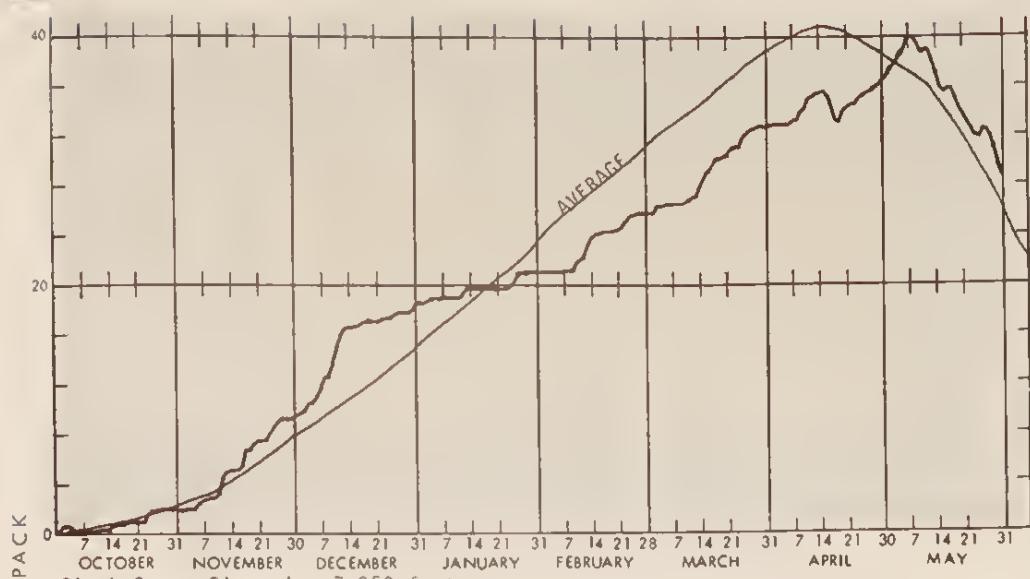
DRAINAGE BASIN and/or SNOW COURSE	NAME	Elevation	THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Last Year
SILVER RUN PILLOW	6630	6/01	SP	.0	.0	.0	0.0
SKALKAHO SUMMIT	7250	5/29	SP	14.3	19.4	15.4	
SKALKAHO SUMMIT PILLOW	7250	6/01	SP	15.5	16.0	18.7	
SKYLARK TRAIL PILLOW	6200	6/01	SP	16.1	10.8	20.6	
SOUTH FORK SHIELDS PILLOW	8100	6/01	SP	24.1	16.2	14.3	
SPOTTED BEAR MOUNTAIN	7000	5/30	SP	.0A	0.0	0.7	
SPUR PARK	8100	5/29	SP	16.2	16.4	18.2	
SPUR PARK PILLOW	8100	6/01	SP	13.8	18.6	17.3	
STAHL PEAK	6030	5/29	SP	35.8	38.6	33.0	
STAHL PEAK PILLOW	6030	6/01	SP	31.5	33.1	27.2	
STRYKER BASIN	6180	5/30	SP	24.3	21.5	19.5	
STUART MOUNTAIN	7400	6/01	SP	26.0	23.0	20.9	
SUCKER CREEK	3960	5/31	SP	.0	.0	0.1	
TAYLOR ROAD	4080	5/31	SP	.0	.0	0.2	
TEPEE CREEK PILLOW	8000	6/01	SP	5.0	8.2	5.7	
TRINKUS LAKE	6100	5/30	SP	30.4	21.4	26.4	
TV MOUNTAIN	6800	6/01	SP	11.5	7.3	10.3	
TWELVEMILE CREEK PILLOW	5600	6/01	SP	.0	.0	0.7	
TWIN CREEKS	3580	5/30	SP	.0A	0.0	0.0	
TWIN LAKES PILLOW	6400	6/01	SP	28.2	18.9	28.9	
UPPER HOLLAND LAKE	6200	6/01	SP	20.0	15.0	21.5	
WALDRON PILLOW	5600	6/01	SP	.0	.0	0.2	
WARM SPRINGS PILLOW	7800	6/01	SP	21.0	18.7	24.3	
WEASEL DIVIDE	5450	5/29	SP	18.6	23.2	19.7	
WEST YELLOWSTONE PILLOW	6700	5/31	SP	.0	0.0	0.0	
WHISKEY CREEK PILLOW	6800	6/01	SP	.0	.0	1.5	
WHITE MILL PILLOW	8700	6/01	SP	20.3	19.1	19.8	
WOOD CREEK PILLOW	5960	6/01	SP	.0	.0	0.0	

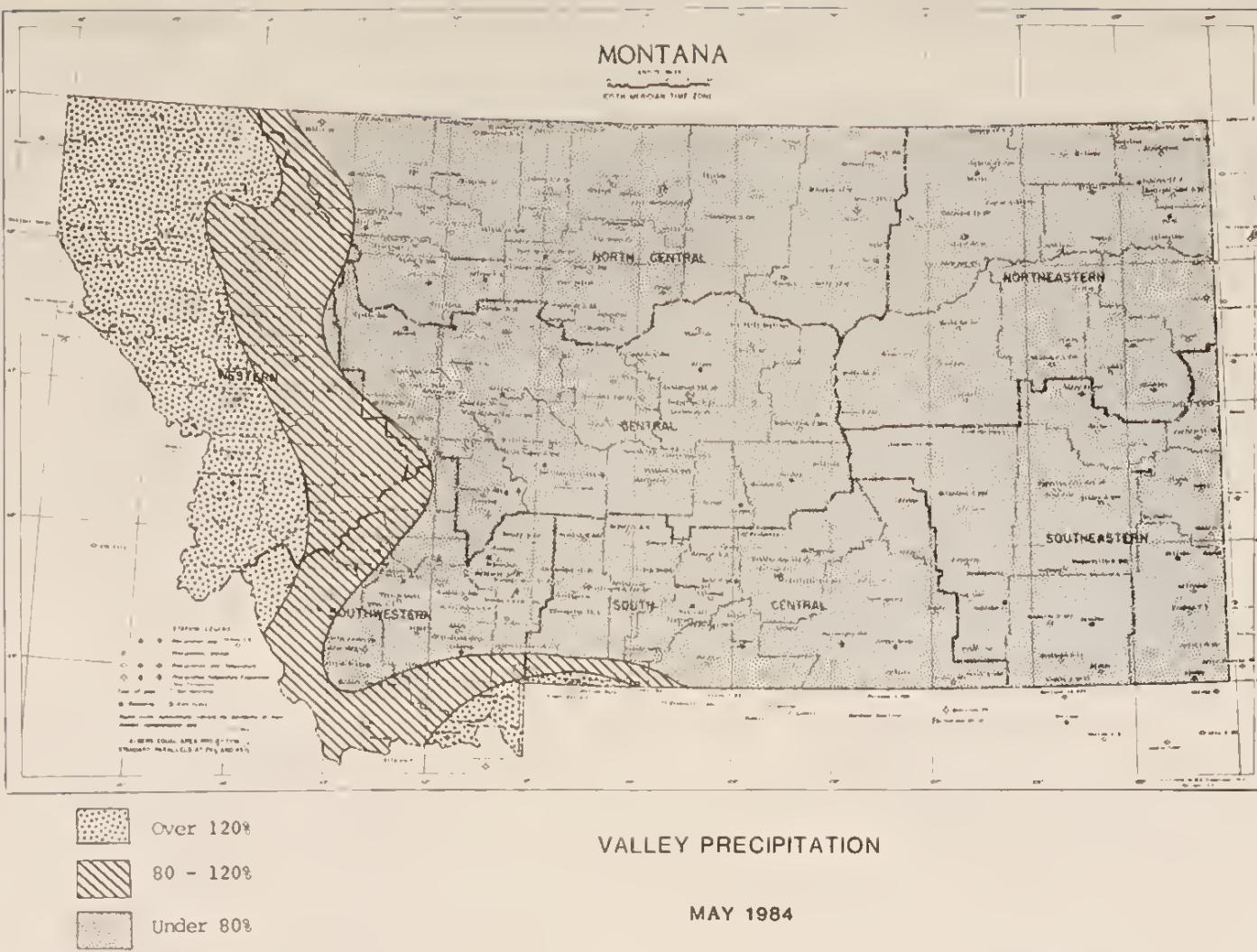
## Unpublished data and corrections to previously published data

SNOW June 1, 1984

DRAINAGE BASIN and/or SNOW COURSE	NAME	Elevation	THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Last Year
GRAVE CREEK PILLOW	4300	6/01	SP	.0	.0	.0	0.0
GUNSLIGHT LAKE	6300	5/30	SP	26.8	19.4	30.0	
HAND CREEK PILLOW	5030	6/01	SP	.0	.0	0.0	
HAWKINS LAKE	6450	5/29	SP	55	23.6	28.0	21.5
HAWKINS LAKE PILLOW	6450	5/29	SP	22.8	27.0	22.5	
HEART LAKE TRAIL	4800	6/01	SP	0	.0	3.1	
HELL ROARING DIVIDE	5770	5/31	SP	37	16.7	11.2	12.9
HERRIG JUNCTION	4850	5/30	SP	2	.6	2.6	
HOOD MEADOW	6600	5/29	SP	2	.6	3.8	2.9
HOODOO BASIN	6050	6/01	SP	71	35.8	36.3	
HOODOO BASIN PILLOW	6050	6/01	SP	31.0	27.5	29.1	
HO							

# SNOW PILLOW DATA





#### AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

##### GOVERNMENT AGENCIES

###### Canada

- Department of the Environment
- Atmospheric Environment Service
- Water Management Service
- British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
- Technical Services Division
- Federal
- Department of the Army - Corps of Engineers
- Department of Agriculture - Forest Service
- Soil Conservation Service
- Department of Commerce - National Environmental Satellite Service
- National Weather Service
- Department of Interior - Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation
- Department of Energy - Bonneville Power Administration

##### STATE AGENCIES

- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

##### PRIVATE ORGANIZATIONS

- The Anaconda Company
- Big Sky of Montana
- Butte Water Company
- Flathead Valley Community College
- Montana Power Company
- Pondera County Canal & Reservoir Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

#### RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH May 31, 1984

Basin or Stream	RESERVOIR	Usable Capacity	Usable Storage		
			This Year	Last Year	Average
<b>COLUMBIA</b>					
Kootenai	Koocanusa	5,748.2	3,237.0	3,427.0	3,214.0
Flathead	Hungry Horse	3,451.0	2,549.0	2,879.0	2,616.0
	Flathead Lake	1,791.0	1,464.0	1,489.0	1,463.0
	Camas (4)	45.2	32.2	38.4	31.1
Clark Fork	Mission Valley (8)	100.3	81.1	85.0	66.5
	Georgetown Lake	31.0	29.3	26.8	26.2
	Lower Willow Creek	4.9	5.1	5.0	4.3
	Nevada Creek	12.6	12.7	12.9	11.5
Bitterroot	Noxon Rapids	334.6	291.1	328.3	258.3
	Painted Rocks	31.7	---	---	30.1
	Como	34.9	33.0	---	27.1
<b>MISSOURI</b>					
Beaverhead	Lima	84.0	82.6	68.4	64.6
	Clark Canyon	257.2	250.7	180.8	163.7
Ruby	Ruby	38.8	40.9	38.8	37.8
Madison	Hebgen Lake	377.5	337.3	263.4	291.7
Gallatin	Ennis Lake	41.0	36.9	38.5	35.8
Missouri	Middle Creek	8.0	6.1	7.2	6.7
	Canyon Ferry	2,043.0	1,795.0	1,675.0	1,651.0
	Hauser & Helena	61.9	62.5	63.0	60.0
	Helena Valley	10.4	10.7	---	7.6
	Lake Helena	10.4	10.7	10.9	9.8
	Holter Lake	81.9	79.6	80.0	77.3
	Fort Peck Lake	18,910.0	16,390.0	16,200.0	15,750.0
Smith	Smith River	10.6	11.6	11.6	10.6
	Newlan Creek	12.4	10.7	9.6	9.5
Musselshell	Bair	7.0	4.9	7.1	6.6
	Martinsdale	23.1	23.3	21.2	17.2
	Deadman's Basin	72.2	64.8	---	57.2
Sun	Gibson	99.1	96.2	92.3	90.1
	Willow Creek	32.2	30.1	26.2	28.2
	Pishkun	32.0	28.5	30.4	31.7
Marias	Lower Two Medicine	11.9	---	---	12.5
	Four Horns	19.2	---	---	13.1
	Swift	30.0	23.6	28.2	24.9
	Lake Frances	111.9	46.3	89.0	88.3
Milk	Elwell (Tiber)	1,347.0	735.0	772.6	648.4
	Beaver Creek	3.5	3.1	3.1	3.0
	Fresno	127.2	14.8	48.8	96.7
	Nelson	66.8	20.2	46.3	44.1
<b>HUDSON BAY</b>					
St. Mary's	Lake Sherburne	64.3	14.5	22.6	31.9
<b>YELLOWSTONE</b>					
Stillwater	Mystic Lake	21.0	2.7	2.7	5.6
Clark's Fork	Cooney	27.4	22.3	22.1	18.8
Tongue	Tongue River	68.0	43.2	39.1	48.8
Bighorn	Bighorn Lake	1,356.0	946.1	896.5	702.7

